Minimally Machined HoneySiC Mirrors for Low Areal Cost and Density, Phase II

Completed Technology Project (2011 - 2014)

Project Introduction

A problem perceived for Trex Enterprises chemical vapor composite silicon carbide CVC SiC

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mirrors is the cost associated with machining and lightweighting the mirrors. Indeed these processes are labor, schedule, risk and cost drivers for our exceptional, high performance variety of silicon carbide material. Although we have made significant strides in improving our baseline CVC SiC

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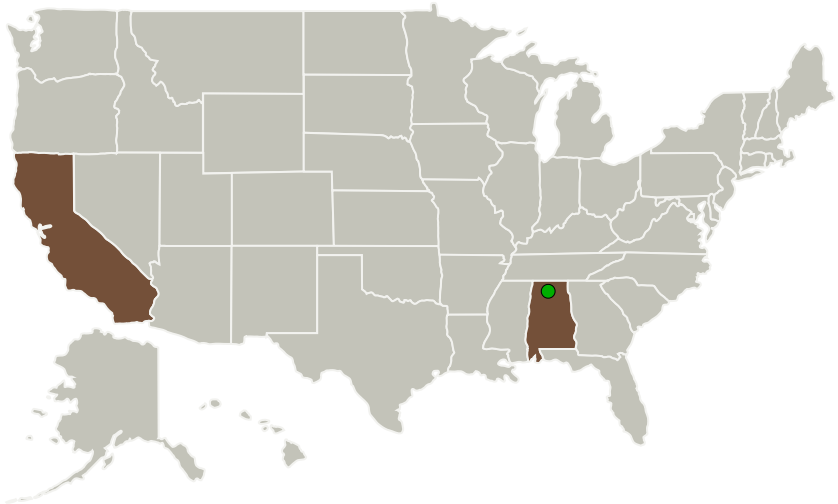
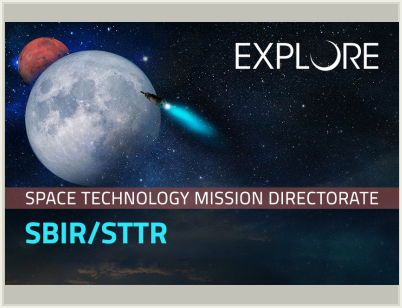
manufacturing processes, the product is still substantially higher priced than the goals of the NASA project. In Phase I, we created and demonstrated a manufacturing process for the new ceramic matrix composite honeycomb panel silicon carbide (HoneySiC or H-SiC) which nearly eliminates the machining and lightweighting process steps for mirrors and opto-mechanical structures. The new material achieves lightweighting of 92% relative to bulk material and net production cost on the order of $38K per square meter (unpolished), less than half of NASA's goal of $100K per square meter. Web thickness, core geometries (pocket depth, pocket size), and mirror shape are easily tailored since H-SiC starts as a molded precursor material. The Phase II project will start at Technology Readiness Level 3 (TRL 3, experimental critical function and characteristic proof of concept) and end at TRL 5 (breadboard in a relevant environment).

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Trex Enterprises Corporation	Lead Organization	Industry	San Diego, California
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	California

Project Transitions

June 2011: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137403)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Trex Enterprises Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

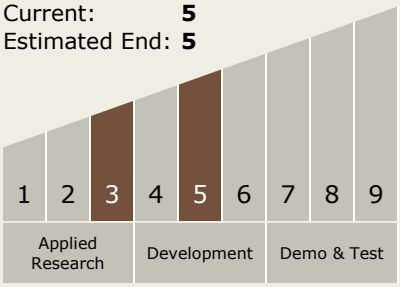
Carlos Torrez

Principal Investigator:

Bill Goodman

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.2 Observatories
    - TX08.2.1 Mirror Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System